From Science and Technology...
Security and Trust

High Priority Technology Needs

May 2007

Homeland Security
Science and Technology

Homeland Security

Science and Technology

May 2007

Science and Technology Directorate investments are tied directly to technology gaps identified by my customers. Those customers are represented by the senior leadership of the agencies and components which comprise DHS. These leaders of DHS work continuously with specialists, technologists and program managers as well as acquisition professionals to ensure investments meet their objectives, and if successful, can be procured.

This booklet provides a summary of technology areas identified for further work by our DHS component partners and contact information for Division Directors. I hope you find it useful.

The Hon. Jay M. Cohen
Under Secretary
Science and Technology Directorate
Department of Homeland Security

Border Security:
Representative Technology Needs

- Improved ballistic protection via personal protective equipment (Borders/Maritime Division Lead)

- Improve detection, tracking, and identification of all threats along the terrestrial and maritime border (Borders/Maritime Division Lead)

- Ability to access ICE databases in which voice information is entered; provide analytical, reporting, and automated case deconfliction; classify, identify voice samples (C2I Division)

- Non-lethal compliance measures for vehicles, vessels, or aircraft allowing for safe interdiction by law enforcement personnel (Borders/Maritime Division Lead)

- Non-destructive tools that allow for the inspection of hidden or closed compartments to find contraband or security threats (Borders/Maritime Division Lead)

- Improved analysis and decision-making tools that will ensure the development/implementation of border security initiatives (Borders/Maritime Division Lead)

- Ability to non-intrusively determine the intent of subjects during questioning (Human Factors Division)

- Ability for law enforcement personnel to quickly identify the origin of gunfire and classify the type of weapon fired (Borders/Maritime Division Lead)

- Ability for law enforcement officers to assure compliance of lawful orders using non-lethal means (Borders/Maritime Division Lead)

Cargo Security:
Representative Technology Needs

- Enhanced screening and examination by non-intrusive inspection (Borders/Maritime Division)

- Increased information fusion, anomaly detection, Automatic Target Recognition capability (Borders/Maritime Division)

- Detect and identify WMD materials and contraband (Borders/Maritime Division)

- Capability to screen 100% of air cargo (Borders/Maritime Division)

- Test the feasibility of seal security; Detection of intrusion (Borders/Maritime Division)

- Track domestic high-threat cargo (Borders/Maritime Division)

- Harden air cargo conveyances and containers (Borders/Maritime Division)

- Positive ID of cargo & detection of intrusion or unauthorized access (Borders/Maritime Division)

Chem/Bio Defense:
Representative Technology Needs

- Tools to detect and mitigate animal disease breakouts (Chem-Bio Division)

- Policy net assessments to provide fresh perspectives on fundamental elements of the national biodefense strategy (Chem-Bio Division)

- Improved tools for integrated CBRN Risk Assessment (Chem-Bio Division)

- Incident characterization capability for response & restoration (Chem-Bio Division)

- Improved ChemBio Forensic Analysis capability (Chem-Bio Division)

- National-scale detection architectures and strategies to address outdoor, indoor (e.g., highly trafficked transportation hubs) and critical infrastructure (Chem-Bio Division)

- Consequence assessments of attacks on chemical facilities and Chem Bio attacks on other critical infrastructure (Chem-Bio Division)

- Integrated CBRNE Sensor Reporting capability (Chem-Bio Division)

- Handheld rapid biological and chemical detection systems (Chem-Bio Division)

- Detection paradigms and systems for enhanced, emerging and novel biological threats (Chem-Bio Division)

Cyber Security:
Representative Technology Needs

- Secure internet protocols including standard security methods (C2I Division)

- Improved capability to model the effects of cyber attacks and understanding of internet topography (C2I Division)

- Comprehensive next-generation network models (C2I Division)

- Composable and scalable secure systems (C2I Division)

- Technologies and standards for managing identities, rights and authorities used in an organization's networks (C2I Division)

- Information system insider threat detection models and mitigation technologies (C2I Division)

- Analytical techniques for security across the IT system engineering life-cycle (C2I Division)

- Process Control Systems (PCS) security (C2I Division)

Explosives Prevention:
Representative Technology Needs

- Standoff detection on persons (portable solutions) (Explosives Division)

- System solution for detection in baggage (checked & carried) (Explosives Division)

- Capability to detect VBIED / large threat mass (container, trailer, ship, vessel, car, rail) (Explosives Division)

- Capability to detect homemade or novel explosives (Explosives Division)

- Capability to assess, render safe, and neutralize explosive threats (Explosives Division)

- Optimize canine explosive detection capability (Explosives Division)
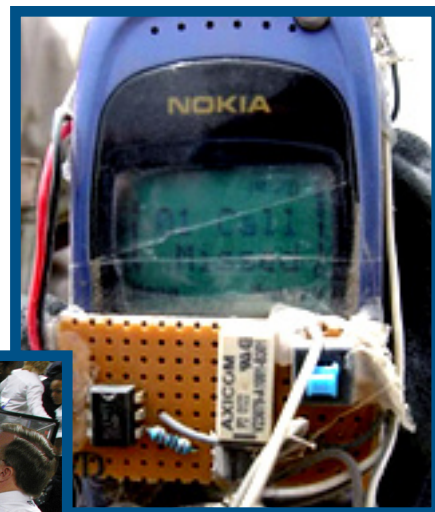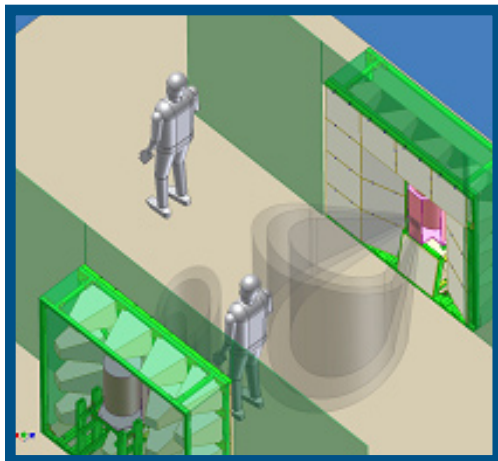
Incident Management:
Representative Technology Needs

- Integrated Modeling, Mapping and Simulation capability (IP/Geophysical Division)

- Personnel Monitoring (Emergency Responder Locator System) capability (IP/Geophysical Division)

- Personnel Monitoring (Physiological Monitoring of Firefighters) capability (IP/Geophysical Division)

- Incident Management Enterprise System (IP/Geophysical Division)

- Logistics management tool (IP/Geophysical Division)
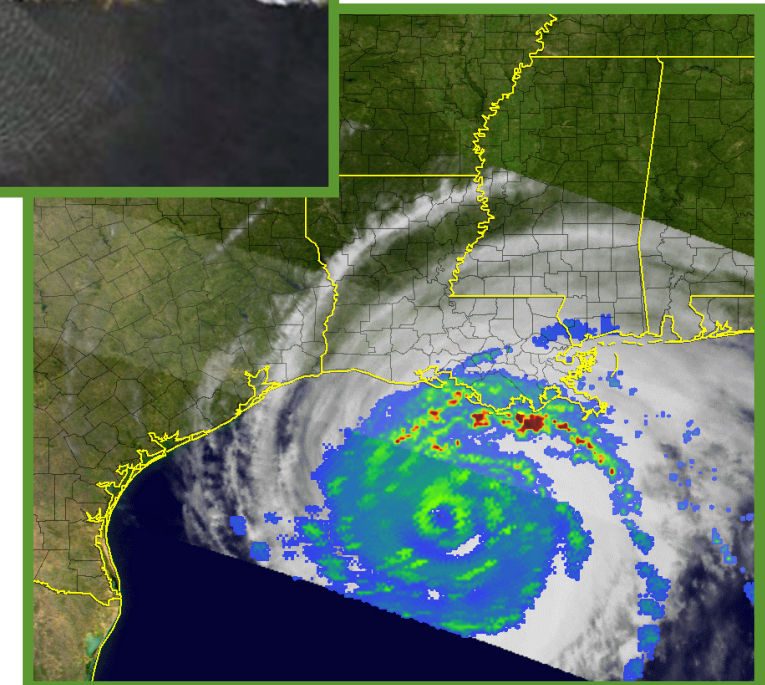
Information Sharing:
Representative Technology Needs

- Data fusion from multiple sensors into Common Operating Picture (COP) (C2I Division)

- Improved real-time data sharing of law enforcement information (C2I Division)

- Management of user identities, rights and authorities (C2I Division)

- Distribution of Intelligence Products (C2I Division)

- Information sharing within/across sectors on terrorist threats (C2I Division)

- Automated, dynamic, real-time data processing and visualization capability (C2I Division)

- Analytic capabilities for structured, unstructured, and streaming data (C2I Division)

- Situational awareness between US Coast Guard and partners (C2I Division)

- Sensor fusion between Law Enforcement and Intelligence Partners (C2I Division)

Infrastructure Protection:
Representative Technology Needs

- Analytical tools to quantify interdependencies and cascading consequences as disruptions occur across critical infrastructure sectors (IP/Geophysical Division)

- Effective and affordable blast analysis and protection for critical infrastructure; improved understanding of blast failure mechanisms and protection measures for the most vital CI/KR (IP/Geophysical Division)

- Advanced, automated and affordable monitoring and surveillance technologies (C2I Division)

Interoperability:
Representative Technology Needs

- Development and evaluation of Internet Protocol (IP) enabled backbones (C2I Division)

- Test and evaluation of emergent wireless broadband data systems (C2I Division)

- Acceleration of development and testing of P25 IP-based interfaces (C2I Division)

- Identification and development of message interface standards (C2I Division)

- Transition of Land Mobile Radios communication architectures to cellular based architectures (C2I Division)

- Evaluation of access technologies (C2I Division)

- Development of the complementary test procedures (C2I Division)

Maritime Security:
Representative Technology Needs

- Wide-area surveillance from the coast to beyond the horizon; port and inland waterways region - detect, ID, and track (Borders/Maritime Division Lead)

- Data fusion and automated tools for command center operations (Borders/Maritime Division Lead)

- Vessel compliance through non-lethal compliance methods (Borders/Maritime Division Lead)

- Enhanced capability to continuously track contraband on ships or containers (Borders/Maritime Division)

- Improved ballistic personal protective equipment for officer safety (Borders/Maritime Division Lead)

- Improved WMD detection equipment for officer safety; improved screening capability for WMD for maritime security checkpoints (Borders/Maritime Division Lead)

People Screening:
Representative Technology Needs

- Systematic collection and analysis of information related to understanding terrorist group intent to engage in violence (Human Factors Division)

- Non-invasive monitoring: Identifying and tracking unknown or potential threats from individuals at key checkpoints. Real-time detection of deception or hostile intent through integrated system of human and machine methods (Human Factors Division)

- Capability in real-time for positive verification of individual's identity utilizing multiple biometrics (Human Factors Division)

- Capability for secure, non-contact electronic credentials; contactless readers or remote interrogation technologies for electronic credentials (Human Factors Division)

- Mobile biometrics screening capabilities, to include hand-held, wireless, and secure devices (Human Factors Division)

- High-speed, high-fidelity ten-print capture capability (Human Factors Division)

DHS S&T Points of Contact:

▶ **Starnes Walker**
Director of Research
Email: S&T-Research@dhs.gov

▶ **Roger McGinnis**
Director of Innovation
Email: S&T-Innovation@dhs.gov

▶ **Bob Hooks**
Director of Transition
Email: S&T-Transition@dhs.gov

▶ **Jim Tuttle**
Division Head, Explosives
Email: S&T-Explosives@dhs.gov

▶ **John Vitko**
Division Head, Chemical/Biological
Email: S&T-ChemBio@dhs.gov

▶ **Dave Boyd**
Division Head, Command, Control, & Interoperability
Email: S&T-C2I@dhs.gov

▶ **Dave Newton**
Division Head (Acting), Borders & Maritime
Email: S&T-BordersMaritime@dhs.gov

▶ **Sharla Rausch**
Division Head, Human Factors
Email: S&T-HumanFactors@dhs.gov

▶ **Chris Doyle**
Division Head (Acting), Infrastructure Protection and Geophysical
Email: S&T-InfrastructureGeophysical@dhs.gov